REMARKS

This application has been carefully reviewed in light of the final Office Action dated January 6, 2009. Claims 13 and 15 to 24 are now pending in the application, with Claim 14 having been cancelled and Claims 21 to 24 having been added herein. Claims 13, 17, 19 and 20 are the independent claims. Reconsideration and further examination are respectfully requested.

Claims 13, 16, 17, 19 and 20 were rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 5,384,715 (Lytton). Claims 14 and 15 were rejected under 35 U.S.C. § 103(a) over Lytton in view of U.S. Patent No. 5,086,279 (Wochnowski). Claim 18 was rejected under 35 U.S.C. § 103(a) over Lytton in view of U.S. Patent No. 5,574,464 (Madonna). Reconsideration and withdrawal of the rejections are respectfully requested.

Claims 13 and 17

The invention of Claims 13 and 17 generally concerns a system or method for counting the number of layers of a multilayer object. In the claims, an oscillation unit/step oscillates an electromagnetic wave having a frequency in a range from 30 GHz to 100 THz to irradiate either a top surface or a bottom surface of the multilayer object. A first reception unit/step then receives electromagnetic wave pulses reflected at interfaces of the layers of the multilayer object. A first processing unit/step then temporally samples an output value of the reflected electromagnetic wave pulses at every split time to obtain a temporal waveform of the reflected electromagnetic wave pulses, wherein the split time is shorter than a pulse width of the temporal waveform. The temporal waveform is used for counting the number of pulses, and the number of layers of the multilayer object is counted on the basis of the counted number of pulses. In addition, a second reception unit/step

receives an electromagnetic wave generated by transmission of the electromagnetic wave oscillated through the multilayer object. A second processing unit/step then detects a delay time of the transmitted electromagnetic wave, relative to an electromagnetic wave to be detected when the multilayer object is absent, for counting the number of layers of the multilayer object on the basis of the delay time. According to one aspect of Claims 13 and 17, the number of layers counted by the first processing unit/step is compared with the number of layers counted by the second processing unit/step, and if the number of layers counted by the first processing unit/step is not equal to the number of layers counted by the second processing unit/step, a computation is made of an average of the number of layers counted by both the first processing unit/step and the second processing unit/step.

Referring specifically to claim language, amended independent Claim 13 is directed to a system for counting the number of layers of a multilayer object. The system includes an oscillation unit for oscillating an electromagnetic wave having a frequency in a range from 30 GHz to 100 THz to irradiate either a top surface or a bottom surface of the multilayer object, a first reception unit for receiving electromagnetic wave pulses reflected at interfaces of the layers of the multilayer object, and a first processing unit for temporally sampling an output value of the reflected electromagnetic wave pulses at every split time to obtain a temporal waveform of the reflected electromagnetic wave pulses, the split time being shorter than a pulse width of the temporal waveform. The temporal waveform is used for counting the number of pulses, and the number of layers of the multilayer object is counted on the basis of the counted number of pulses. The system further includes a second reception unit for receiving an electromagnetic wave generated by transmission of the electromagnetic wave oscillated by the oscillation unit through the multilayer object,

and a second processing unit for detecting a delay time of the transmitted electromagnetic wave, relative to an electromagnetic wave to be detected when the multilayer object is absent, for counting the number of layers of the multilayer object on the basis of the delay time. The number of layers counted by the first processing unit is compared with the number of layers counted by the second processing unit, and if the number of layers counted by the first processing unit is not equal to the number of layers counted by the second processing unit, an average of the number of layers counted by both the first processing unit and the second processing unit is computed.

Amended independent Claim 17 is a method claim that substantially corresponds to the system of Claim 13.

The applied art, alone or in any permissible combination, is not seen to disclose or suggest the features of Claims 13 and 17, and in particular, the applied art is not seen to disclose or suggest at least the features of a first processing unit/step of temporally sampling an output value of reflected electromagnetic wave pulses at every split time to obtain a temporal waveform of the reflected electromagnetic wave pulses, the split time being shorter than a pulse width of the temporal waveform, wherein the temporal waveform is used for counting the number of pulses, and a number of layers of a multilayer object is counted on the basis of the counted number of pulses, a second reception unit/step of receiving an electromagnetic wave generated by transmission of an electromagnetic wave oscillated through the multilayer object, and a second processing unit/step of detecting a delay time of the transmitted electromagnetic wave, relative to an electromagnetic wave to be detected when the multilayer object is absent, for counting the number of layers of the multilayer object on the basis of the delay time, wherein the

number of layers counted by the first processing unit/step is compared with the number of layers counted by the second processing unit/step, and if the number of layers counted by the first processing unit/step is not equal to the number of layers counted by the second processing unit/step, an average of the number of layers counted by both the first processing unit/step and the second processing unit/step is computed.

In this regard, Lytton is seen to disclose a system used to obtain digitized images of a reflected radar signal from a multilayer signal. Standard mathematical techniques are then applied to these images to determine a number layers, a thickness of each layer, and a dielectric constant for each layer within the multilayer system. (See Abstract of Lytton). For example, the number of peaks in a reflected signal indicates the number of layers comprising a pavement system, the ratio of reflected signal peaks provides information regarding the dielectric constant of the different layers within the pavement system, and the time between peak values can be used to determine the thicknesses of the different layers within the pavement system. However, Lytton is not seen to disclose a first processing unit/step of temporally sampling an output value of reflected electromagnetic wave pulses at every split time to obtain a temporal waveform of the reflected electromagnetic wave pulses, the split time being shorter than a pulse width of the temporal waveform, wherein the temporal waveform is used for counting the number of pulses, and a number of layers of a multilayer object is counted on the basis of the counted number of pulses, a second reception unit/step of receiving an electromagnetic wave generated by transmission of an electromagnetic wave oscillated through the multilayer object, and a second processing unit/step of detecting a delay time of the transmitted electromagnetic wave, relative to an electromagnetic wave to be detected when the

multilayer object is absent, for counting the number of layers of the multilayer object on the basis of the delay time, wherein the number of layers counted by the first processing unit/step is compared with the number of layers counted by the second processing unit/step, and if the number of layers counted by the first processing unit/step is not equal to the number of layers counted by the second processing unit/step, an average of the number of layers counted by both the first processing unit/step and the second processing unit/step is computed.

Wochnowski is seen to disclose exposing a commodity to electrical energy having at least one characteristic which is influenced by moisture, monitoring the energy which has penetrated the commodity, and generating first signals denoting the at least one (influenced) characteristic of monitored electrical energy. (See column 2, lines 7 to 21 of Wochnowski). The first signals are indicative of the extent of damping of oscillations of electrical energy as a result of penetration of energy into the commodity. (See column 2, lines 22 to 27 of Wochnowski). In addition, the commodity can also be exposed to electromagnetic waves which are reflected by the commodity and the oscillations of which are damped by moisture in the commodity. The reflected waves are monitored and second signals denoting the extent of damping of reflected waves are generated. The first and second signals can then be averaged and the averaged first and second signals are utilized for the generation of moisture signals. (See column 2, lines 35 to 39 of Wochnowski).

However, Wochnowski is not seen to teach anything that, when combined with Lytton, assuming such could be combined, would have resulted in at least the features of a first processing unit/step of temporally sampling an output value of reflected electromagnetic wave pulses at every split time to obtain a temporal waveform of the

reflected electromagnetic wave pulses, the split time being shorter than a pulse width of the temporal waveform, wherein the temporal waveform is used for counting the number of pulses, and a number of layers of a multilayer object is counted on the basis of the counted number of pulses, a second reception unit/step of receiving an electromagnetic wave generated by transmission of an electromagnetic wave oscillated through the multilayer object, and a second processing unit/step of detecting a delay time of the transmitted electromagnetic wave, relative to an electromagnetic wave to be detected when the multilayer object is absent, for counting the number of layers of the multilayer object on the basis of the delay time, wherein the number of layers counted by the first processing unit/step is compared with the number of layers counted by the second processing unit/step, and if the number of layers counted by the first processing unit/step is not equal to the number of layers counted by the second processing unit/step, an average of the number of layers counted by both the first processing unit/step and the second processing unit/step is computed.

Madonna is not seen to cure the above-described deficiencies of Lytton and Wochnowski. In this regard, Madonna is merely seen to disclose a switching device which uses an array of high-speed photoconductive semiconductor switches laid out in a stripline configuration to achieve a transmitter-to-receiver isolation sufficient to support a monostatic configuration for a high-power, monostatic impulse radar. However, Madonna is not seen to teach anything that, when combined with Wochnowski and/or Lytton, assuming such could be combined, would have resulted in at least the features of a first processing unit/step of temporally sampling an output value of reflected electromagnetic wave pulses at every split time to obtain a temporal waveform of the reflected

electromagnetic wave pulses, the split time being shorter than a pulse width of the temporal waveform, wherein the temporal waveform is used for counting the number of pulses, and a number of layers of a multilayer object is counted on the basis of the counted number of pulses, a second reception unit/step of receiving an electromagnetic wave generated by transmission of an electromagnetic wave oscillated through the multilayer object, and a second processing unit/step of detecting a delay time of the transmitted electromagnetic wave, relative to an electromagnetic wave to be detected when the multilayer object is absent, for counting the number of layers of the multilayer object on the basis of the delay time, wherein the number of layers counted by the first processing unit/step is compared with the number of layers counted by the second processing unit/step, and if the number of layers counted by the first processing unit/step is not equal to the number of layers counted by the second processing unit/step, an average of the number of layers counted by both the first processing unit/step and the second processing unit/step is computed.

Accordingly, independent Claims 13 and 17 are believed to be allowable, and such action is respectfully requested.

<u>Claims 19 and 20</u>

The invention of Claims 19 and 20 generally concerns a system or method for counting the number of layers of a multilayer object. Among many features, Claims 19 and 20 include the features of a reception unit/step of receiving an output value of electromagnetic wave pulses reflected at interfaces of layers of a multilayer object, a processing unit/step of counting a number of layers of the multilayer object on a basis of the number of pulses which is counted by using a temporal waveform of the reflected electromagnetic wave pulses, wherein the reception unit/step temporally samples output

values of the reflected electromagnetic wave pulses at every split time, the split time being shorter than a pulse width of the temporal waveform.

Referring specifically to claim language, amended independent Claim 19 is directed to a system for counting the number of layers of a multilayer object. The system includes an oscillation unit for oscillating an electromagnetic wave having a frequency in a range from 30 GHz to 100 THz to irradiate either a top surface or a bottom surface of the multilayer object, and a reception unit for receiving an output value of electromagnetic wave pulses reflected at interfaces of the layers of the multilayer object. The system further includes a processing unit for counting the number of layers of the multilayer object on the basis of the number of pulses which is counted by using a temporal waveform of the reflected electromagnetic wave pulses. The reception unit temporally samples output values of the reflected electromagnetic wave pulses at every split time, the split time being shorter than a pulse width of the temporal waveform, and the processing unit obtains the temporal waveform by using the output values.

Amended independent Claim 20 is directed to a method that substantially corresponds to the system of Claim 19.

The applied art, alone or in any permissible combination, is not seen to disclose or suggest the features of Claims 19 and 20, and in particular, is not seen to disclose or suggest at least the features of a reception unit/step of receiving an output value of electromagnetic wave pulses reflected at interfaces of layers of a multilayer object, a processing unit/step of counting a number of layers of the multilayer object on a basis of the number of pulses which is counted by using a temporal waveform of the reflected electromagnetic wave pulses, wherein the reception unit/step temporally samples output

values of the reflected electromagnetic wave pulses at every split time, the split time being shorter than a pulse width of the temporal waveform.

In this regard, Lytton is seen to disclose that a sample rate of a ground penetrating radar (GPR) system's receiver or signal processor needs to be sufficiently high that a high resolution representation of the signal is made. This requirement is driven by the well-known sampling theory of Nyquist. (See column 9, lines 40 to 46 of Lytton). Thus, Lytton is seen to disclose making a high resolution representation of a signal after receiving the signal by the GPR's receiver or signal processor using a sampling theory of Nyquist. In contrast, in the invention of Claims 19 and 20, an output value of electromagnetic wave pulses reflected at interfaces of layers of a multilayer object is received by a reception unit/step, a number of layers of the multilayer object is counted by the processing unit/step on a basis of the number of pulses which is counted by using a temporal waveform of the reflected electromagnetic wave pulses, and output values of the reflected electromagnetic wave pulses are temporally sampled by the reception unit/step at every split time, the split time being shorter than a pulse width of the temporal waveform. In other words, in the invention of Claims 19 and 20, the output values of the reflected electromagnetic wave pulses are being temporally sampled at the time of reception by the reception unit/step.

As described above, Wochnowski is seen to disclose exposing a commodity to electrical energy having at least one characteristic which is influenced by moisture, and monitoring the energy which has penetrated the commodity and generating first signals denoting the at least one (influenced) characteristic of monitored electrical energy. (See column 2, lines 7 to 21 of Wochnowski). The first signals are indicative of the extent of

damping of oscillations of electrical energy as a result of penetration of energy into the commodity. (See column 2, lines 22 to 27 of Wochnowski). However, Wochnowski is not seen to teach anything that, when combined with Lytton, assuming such could be combined, would have resulted in at least the features of a reception unit/step of receiving an output value of electromagnetic wave pulses reflected at interfaces of layers of a multilayer object, a processing unit/step of counting a number of layers of the multilayer object on a basis of the number of pulses which is counted by using a temporal waveform of the reflected electromagnetic wave pulses, wherein the reception unit/step temporally samples output values of the reflected electromagnetic wave pulses at every split time, the split time being shorter than a pulse width of the temporal waveform.

Madonna is not seen to cure the above-described deficiencies of Lytton and Wochnowski. In this regard, Madonna is merely seen to disclose a switching device which uses an array of high-speed photoconductive semiconductor switches laid out in a stripline configuration to achieve a transmitter-to-receiver isolation sufficient to support a monostatic configuration for a high-power, monostatic impulse radar. However, Madonna is not seen to teach anything that, when combined with Wochnowski and/or Lytton, assuming such could be combined, would have resulted in at least the features of a reception unit/step of receiving an output value of electromagnetic wave pulses reflected at interfaces of layers of a multilayer object, a processing unit/step of counting a number of layers of the multilayer object on a basis of the number of pulses which is counted by using a temporal waveform of the reflected electromagnetic wave pulses, wherein the reception unit/step temporally samples output values of the reflected electromagnetic wave pulses at every split time, the split time being shorter than a pulse width of the temporal waveform.

Accordingly, Claims 19 and 20 are believed to be allowable, and such action is respectfully requested.

The other claims in the application are each dependent from the independent claims discussed above and are believed to be allowable over the applied art for at least the same reasons. Because each dependent claim is deemed to define an additional aspect of the invention, however, the individual consideration of each on its own merits is respectfully requested.

No other matters having been raised, the entire application is believed to be in condition for allowance and such action is respectfully requested at the Examiner's earliest convenience.

Applicants' undersigned attorney may be reached in our Costa Mesa, California office at (714) 540-8700. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

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